

What is claimed is:

1. An ink jet printable heat transfer material comprising:

a cold release layer;

a wash layer; and

an ink receptive layer.

2. The ink jet printable heat transfer material of claim 1 further comprising a substrate.

3. The ink jet printable heat transfer material of claim 2 wherein the substrate comprises:

one or more hardwood fibers;

one or more softwood fibers; and

precipitated calcium carbonate.

4. The ink jet printable heat transfer material of claim 1 further comprising a precoat layer.

5. The ink jet printable heat transfer material of claim 4 wherein the precoat layer comprises:

a pigment mixture of natural and synthesized inorganic pigments;

one or more latexes;

one or more binders;

one or more flow agents;

one or more slip agents;

one or more optical brighteners; and

one or more dyes.

6. The ink jet printable heat transfer material of claim 5 wherein the pigment mixture is between about 5 and about 95 dry percent of the precoat layer.

7. The ink jet printable heat transfer material of claim 5 wherein the pigment mixture comprises one or more of the group consisting of clay, calcium carbonate, titanium dioxide and alumina.
8. The ink jet printable heat transfer material of claim 5 wherein the latexes are between about 1  
5 and about 50 dry percent of the precoat layer.
9. The ink jet printable heat transfer material of claim 5 wherein the latexes comprise one or more of the group consisting of polyvinyl acetate, styrene-butadiene, acrylics, vinyl-acetate, ethylene-vinyl chloride, and urethanes.
10. The ink jet printable heat transfer material of claim 5 wherein the binders comprise one or  
10 more of the group consisting of starch, protein, vinyl alcohol and gelatin.
11. The precoat layer of claim 4 wherein the precoat layer is coated at a coat weight of about 1 to about 50 dry gsm.
12. The precoat layer of claim 4 wherein the precoat layer is coated at a coat weight of about 11 to about 23 dry gsm.
- 15 13. The ink jet printable heat transfer material of claim 1 wherein the cold release layer comprises:  
  
one or more silicones;  
  
one or more crosslinkers; and  
  
one or more controlled release additives for silicone chemistries.
- 20 14. The ink jet printable heat transfer material of claim 13 wherein the cold release layer further comprises one or more matting agents.
15. The ink jet printable heat transfer material of claim 13 wherein the silicones comprise one or more of the group consisting of thermally curable solvent based silicone, thermally curable

solventless silicone, thermally curable emulsion silicone, ultraviolet curable acrylate silicone, and ultraviolet curable epoxy silicone.

16. The ink jet printable heat transfer material of claim 13 wherein the silicones comprise about 1 to about 99 dry percent of the cold release layer.

5 17. The ink jet printable heat transfer material of claim 13 wherein the crosslinkers comprise one or more of the group consisting of tin catalyzed crosslinkers, platinum catalyzed crosslinkers, ultraviolet free radical catalyzed crosslinkers, and ultraviolet cationic catalyzed crosslinkers.

18. The ink jet printable heat transfer material of claim 14 wherein the matting agents comprise one or more of the group consisting of fumed silica, precipitated silica, solgel silica, colloidal  
10 silica, silicates, nylon copolymers, ground calcium carbonate, precipitated calcium carbonate, alumina, and clay.

19. The ink jet printable heat transfer material of claim 13 wherein the cold release layer further comprises one or more defoamers.

20. The ink jet printable heat transfer material of claim 13 wherein the cold release layer further  
15 comprises one or more dyes.

21. The ink jet printable heat transfer material of claim 13 wherein the cold release layer further comprises one or more optical brighteners.

22. The cold release layer of claim 13 wherein the cold release layer is coated at a coat weight of about 0.5 to about 7 dry gsm.

20 23. The cold release layer of claim 13 wherein the cold release layer is coated at a coat weight of about 1 to about 5 dry gsm.

24. The ink jet printable heat transfer material of claim 1 wherein the wash layer comprises:  
one or more ethylene acrylic acids;

one or more non-water soluble plasticizers;

one or more ethylene-vinyl chlorides;

one or more urethane adhesion promoters;

one or more fluorosurfactant wetting and flow agents;

5 one or more copolyamine resins;

one or more hard waxes;

one or more non-water soluble antioxidants; and

a mixture of water soluble and non-water soluble cationic polymers.

25. The ink jet printable heat transfer material of claim 24 wherein the hard waxes comprise one  
10 or more of the group consisting of polyethylene wax and polypropylene wax.

26. The ink jet printable heat transfer material of claim 24 wherein the ethylene acrylic acid is  
between about 10 and about 100 dry percent of the wash layer.

27. The ink jet printable heat transfer material of claim 24 wherein the non-water soluble  
plasticizer is between about 0 and about 30 dry percent of the wash layer.

15 28. The ink jet printable heat transfer material of claim 24 wherein the ethylene-vinyl chloride is  
between about 0 and about 50 dry percent of the wash layer.

29. The ink jet printable heat transfer material of claim 24 wherein the urethane adhesion  
promoter is between about 0 and about 50 dry percent of the wash layer.

20 30. The ink jet printable heat transfer material of claim 24 wherein the fluorosurfactant wetting  
and flow agent is between about 0 and about 5 dry percent of the wash layer.

31. The ink jet printable heat transfer material of claim 24 wherein the copolyamine resin is  
between about 0 and about 100 dry percent of the wash layer.

32. The ink jet printable heat transfer material of claim 24 wherein the hard wax is between about 0 and about 100 dry percent of the wash layer.

33. The ink jet printable heat transfer material of claim 24 wherein the antioxidant is between about 0 and about 10 dry percent of the wash layer.

5 34. The ink jet printable heat transfer material of claim 24 wherein the cationic polymer is between about 0 and about 20 dry percent of the wash layer.

35. The ink jet printable heat transfer material of claim 24 wherein the wash layer further comprises one or more antifoaming agents.

10 36. The ink jet printable heat transfer material of claim 24 wherein the wash layer is coated at a coat weight of about 1 to about 100 dry gsm.

37. The ink jet printable heat transfer material of claim 24 wherein the wash layer is coated at a coat weight of about 30 to about 40 dry gsm.

38. The ink jet printable heat transfer material of claim 1 wherein the ink receptive layer comprises:

- 15       one or more hard waxes;
- one or more high porosity powders;
- one or more ethylene-vinyl chloride emulsions;
- one or more water soluble cationic polymers;
- one or more non-water soluble cationic polymers;
- 20       one or more non-water soluble plasticizers;
- one or more non-water soluble antioxidants;
- a mixture of flow and wetting agents; and
- one or more high porosity inorganic material.

39. The ink jet printable heat transfer material of claim 38 wherein the high porosity powders comprise one or more of the group consisting of polyamide resin and copolyamide resin.
40. The ink jet printable heat transfer material of claim 38 wherein the hard wax comprises one or more of the group consisting of polyethylene wax and polypropylene wax.
- 5 41. The ink jet printable heat transfer material of claim 38 wherein the hard wax is between about 0 and about 50 dry percent of the ink receptive layer.
42. The ink jet printable heat transfer material of claim 38 wherein the high porosity powder is between about 50 and about 95 dry percent of the ink receptive layer.
43. The ink jet printable heat transfer material of claim 38 wherein the ethylene-vinyl chloride  
10 emulsion is between about 0 and about 20 dry percent of the ink receptive layer.
44. The ink jet printable heat transfer material of claim 38 wherein the water soluble cationic polymer is between about 0 and about 15 dry percent of the ink receptive layer.
45. The ink jet printable heat transfer material of claim 38 wherein the non-water soluble cationic polymer is between about 0 and about 20 dry percent of the ink receptive layer.
- 15 46. The ink jet printable heat transfer material of claim 38 wherein the non-water soluble plasticizer is between about 0 and about 40 dry percent of the ink receptive layer.
47. The ink jet printable heat transfer material of claim 38 wherein the non-water soluble antioxidant is between about 0 and about 10 dry percent of the ink receptive layer.
48. The composition of claim 38 wherein the mixture of flow and wetting agents is between  
20 about 0 and about 5 dry percent of the ink receptive layer.
49. The ink jet printable heat transfer material of claim 38 wherein the high porosity powder is between about 50 and about 95 dry percent of the ink receptive layer.

50. The ink jet printable heat transfer material of claim 38 wherein the high porosity inorganic material is between about 0 and about 80 dry percent of the ink receptive layer.

51. The ink jet printable heat transfer material of claim 38 wherein the high porosity inorganic material comprises one or more of the group consisting of alumina, silica gel, precipitated silica, fumed silica, colloidal silica and solgel silica.

52. The ink jet printable heat transfer material of claim 38 wherein the ink receptive layer further comprises one or more anti-foaming agents.

53. The ink jet printable heat transfer material of claim 38 wherein the ink receptive layer is coated at a coat weight of about 1 to about 100 dry gsm.

54. The ink jet printable heat transfer material of claim 38 wherein the ink receptive layer is coated at a coat weight of about 15 to about 30 dry gsm.

55. A cold release layer material comprising:

one or more silicones;

one or more crosslinkers;

one or more matting agents; and

one or more controlled release additives for silicone chemistries.

56. The cold release layer material of claim 55 wherein the silicones comprise one or more of the group consisting of thermally curable solvent based silicone, thermally curable solventless silicone, thermally curable emulsion silicone, ultraviolet curable acrylate silicone, and ultraviolet curable epoxy silicone.

57. The cold release layer material of claim 55 wherein the silicones comprise about 1 to about 99 dry percent of the composition.

58. The cold release layer material of claim 55 wherein the crosslinkers comprise one or more of the group consisting of tin catalyzed crosslinkers, platinum catalyzed crosslinkers, ultraviolet free radical catalyzed crosslinkers, and ultraviolet cationic catalyzed crosslinkers.

59. The cold release layer material of claim 55 wherein the matting agents comprise one or more of the group consisting of fumed silica, precipitated silica, solgel silica, silicates, nylon copolymers, ground calcium carbonate, precipitated calcium carbonate, alumina, and clay.

60. The cold release layer material of claim 55 further comprising one or more defoamers.

61. The cold release layer material of claim 55 further comprising one or more dyes.

62. The cold release layer material of claim 55 further comprising one or more optical brighteners.

63. The cold release layer material of claim 55 wherein the material is coated at a coat weight of about 0.5 to about 7 dry gsm.

64. The cold release layer material of claim 55 wherein the material is coated at a coat weight of about 1 to about 5 dry gsm.

65. A wash layer material comprising:

one or more ethylene acrylic acids;

one or more non-water soluble plasticizers;

one or more ethylene-vinyl chloride;

one or more urethane adhesion promoters;

one or more fluorosurfactant wetting and flow agents;

one or more copolyamine resin;

one or more hard waxes;

a mixture of water soluble and non-water soluble cationic polymers; and



one or more non-water soluble antioxidants.

66. The wash layer material of claim 65 wherein the hard wax comprises one or more of the group consisting of polyethylene wax and polypropylene wax.

67. The wash layer material of claim 65 wherein the ethylene acrylic acid is between about 10 and about 100 dry percent of the material.

68. The wash layer material of claim 65 wherein the non-water soluble plasticizer is between about 0 and about 30 dry percent of the material.

69. The wash layer material of claim 65 wherein the ethylene-vinyl chloride is between about 0 and about 50 dry percent of the material.

70. The wash layer material of claim 65 wherein the urethane adhesion promoter is between about 0 and about 50 dry percent of the material.

71. The wash layer material of claim 65 wherein the fluorosurfactant wetting and flow agent is between about 0 and about 5 dry percent of the material.

72. The wash layer material of claim 69 wherein the copolyamine resin is between about 0 and about 100 dry percent of the material.

73. The wash layer material of claim 65 wherein the hard wax is between about 0 and about 100 dry percent of the material.

74. The wash layer material of claim 65 wherein the non-water soluble antioxidant is between about 0 and about 10 dry percent of the material.

75. The wash layer material of claim 65 wherein the non-water soluble cationic polymer is between about 0 and about 20 dry percent of the material.

76. The wash layer material of claim 65 wherein the water soluble cationic polymer is between about 0 and about 20 dry percent of the material.

77. The wash layer material of claim 65 further comprising one or more antifoaming agents.

78. The wash layer material of claim 65 wherein the material is coated at a coat weight of about 1 to about 100 dry gsm.

79. The wash layer material of claim 65 wherein the wash layer material is coated at a coat weight of about 30 to about 40 dry gsm.

80. An ink receptive layer material comprising:

one or more polyethylene waxes;

one or more high porosity polyamide powders;

one or more ethylene-vinyl chloride emulsions;

one or more water soluble cationic polymers;

one or more non-water soluble cationic polymers;

one or more non-water soluble plasticizers;

one or more non-water soluble antioxidants;

a mixture of flow and wetting agents; and

one or more high porosity silicas.

81. The ink receptive layer material of claim 80 wherein the polyethylene wax is between about 0 and about 50 dry percent of the material.

82. The ink receptive layer material of claim 80 wherein the high porosity polyamide powder is between about 50 and about 95 dry percent of the material.

83. The ink receptive layer material of claim 80 wherein the ethylene-vinyl chloride emulsion is between about 0 and about 20 dry percent of the material.

84. The ink receptive layer material of claim 80 wherein the water soluble cationic polymer is between about 0 and about 15 dry percent of the material.

85. The ink receptive layer material of claim 80 wherein the non-water soluble cationic polymer is between about 0 and about 20 dry percent of the material.

86. The ink receptive layer material of claim 80 wherein the non-water soluble plasticizer is between about 0 and about 40 dry percent of the material.

5 87. The ink receptive layer material of claim 80 wherein the non-water soluble antioxidant is between about 0 and about 10 dry percent of the material.

88. The ink receptive layer material of claim 80 wherein the mixture of flow and wetting agents is between about 0 and about 5 dry percent of the material.

10 89. The ink receptive layer material of claim 80 wherein the high porosity silica is between about 0 and about 80 dry percent of the material.

90. The ink receptive layer material of claim 80 wherein the high porosity silica comprises one or more of the group consisting of silica gel, precipitated silica, fume silica and solgel silica.

91. The ink receptive layer material of claim 80 further comprising one or more anti-foaming agents.

15 92. The ink receptive layer material of claim 80 wherein the material is coated at a coat weight of about 1 to about 100 dry gsm.

93. The ink receptive layer material of claim 80 wherein the material is coated at a coat weight of about 15 to about 30 dry gsm.

94. An ink jet printable heat transfer material comprising:

a substrate, said substrate comprising hardwood fibers, softwood fibers and precipitated calcium carbonate;

a precoat layer, said precoat layer comprising clay, polyvinyl alcohol,

carboxymethylcellulose and a binder;

a cold release layer, said cold release layer comprising emulsion silicone, a matting agent and catalyst;

a wash layer, said wash layer comprising ethylene acrylic acid, urethane adhesion promoter, non-water soluble plasticizer, and fluorosurfactant; and

an ink receptive layer, said ink receptive layer comprising polyethylene wax, high porosity polyamide powder, ethylene-vinyl chloride emulsion, cationic acrylic synthetic pigment, cationic polymer, non-water soluble plasticizer, dispersion stabilizer, non-water soluble antioxidant, isopropanol, acetone and a mixture of wetting and flow agents.

95. A precoat layer material comprising:

clay;

polyvinyl alcohol;

thickener; and

latex binder.

96. A cold release layer material comprising:

emulsion silicone;

matting agent; and

catalyst.

97. A wash layer material comprising:

ethylene acrylic acid;  
urethane adhesion promoter;  
non-water soluble plasticizer; and  
fluorosurfactant.

5     98.     An ink receptive layer material comprising:

polyethylene wax;  
high porosity polyamide powder;  
ethylene-vinyl chloride emulsion;  
cationic acrylic synthetic pigment;  
10     cationic polymer;  
non-water soluble plasticizer;  
dispersion stabilizer;  
non-water soluble antioxidant;  
isopropanol;  
15     acetone; and  
wetting and flow agent.